

**P a t e n t   C l a i m s**

1.  
System for detection of the surface geometry of an object (6), comprising a sensor  
unit (1) with apparatus (2) for local, point by point detection of surface geometry, and  
a robot unit (4) for moving the sensor unit (1), characterized in that  
the sensor unit (1) includes an optical scanner unit (2) for non-touch probing and  
detection of the surface geometry of the object, and a position measuring unit (3)  
designed to determine the position of the sensor unit (1) in a global coordinate system  
defined by a network (8) of reference points (9) in known positions, and that  
a computing unit (5) is provided and designed for collection of data from the scanner  
unit (2) and the position measuring unit (3) and for transformation of the data from the  
scanner unit (2) to relate them to the global coordinate system.
2.  
System as defined in claim 1, characterized in that  
the robot unit (4) is designed for stepwise movement of the sensor unit (1).
3.  
System as defined in claim 1, characterized in that  
the position measuring unit (3) consists of a camera-based sensor (7) and that  
said unit (3) is designed for registering an image of a network (8) consisting of  
reference points (9) in known positions.
4.  
System as defined in claim 1, characterized in that  
the network (8) of reference points (9) is on the object, and that  
the position for each reference point in the network is known relative to a coordinate  
system related to the object
5.  
System as defined in claim 1, characterized in that  
the robot unit (4) is designed to move the sensor unit (1) step-wise over the object (6).
6.  
System as defined in one or more of the preceding claims, characterized in that

the scanner unit (2) is chosen from the following group: laser scanner, single-point distance meter, laser-based triangulation sensor combined with camera, triangulation sensor with two-axis scanning laser, triangulation sensor with laser raster projection in combination with camera, sensor based on pattern projection combined with at least one camera.

7.

System as defined in one or more of the preceding claims, characterized in that the robot unit (4) is chosen from the following group: arm-based robot, Cartesian robot, robot with one, two or more degrees of freedom, program controlled robot, real-time position-controlled robot based on registered position of the sensor unit (1) in relation to the object and instruction for movement relative to current position.

8.

System as described in one or more of the preceding claims, characterized in that said camera in the unit (3) for measuring position is a CCD camera.

9.

System as described in claim 4, characterized in that the reference points (9) are holes or depressions in the surface of the object (6).

10.

System as described in claim 4 or 9, characterized in that the reference points (9) consist of so-called "targets" placed on the object (6) or in the mentioned holes or depressions in the surface of the object (6).

11.

Method for detection of the surface geometry of an object (6), where one uses a sensor unit (1) comprising apparatus (2) for local, point by point detection of the surface geometry, a position measuring unit (3) to determine the position of the sensor unit in relation to a network (8) of reference points (9) in known positions relative to a global coordinate system, and a robot unit for moving the sensor unit, characterized in that

the sensor unit (1) is positioned such that a region of the surface of the object (6) is inside the measurement volume of the scanner unit (2), and that this region is scanned ,

that the position measuring unit (3) simultaneously determines the position of the scanner unit (1) relative to the coordinate system of the network (8), and that the data from the scanner unit (2) are transferred to a computing unit (5) where they are transformed to the coordinate system of the network (8) and stored.

5

12.

Method as specified in claim 11, characterized in stepwise movement of the sensor unit (1) by the robot unit (4).

10 13.

Method for calibration of a sensor unit (1) which comprises apparatus (2) for local detection of a surface geometry, and a position measuring unit (3) to determine the position of the sensor unit in a global coordinate system relative to a network (8) of reference points (9) in known positions, and where the sensor unit (1) is mounted on a robot unit (4) for movement relative to an object (6) characterized in that the sensor unit (1) is positioned such that at least one of the reference points (9) is inside the measurement volume of the scanner unit (2), that the position of the reference point (9) relative to the scanner (2) is determined, that the position measuring unit (3) simultaneously determines the position of the sensor (1) relative to the coordinate system of the network (8), that this is repeated until the position of at least three reference points (9) have been determined relative to the coordinate system of the scanner unit, and that a transformation matrix is calculated based on the data registered by the scanner unit (2) and the position measuring unit (3) and which describes the relationship between the two units.

25